



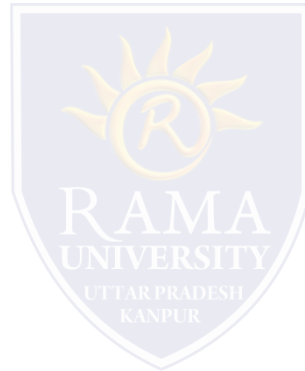
RAMA  
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FACULTY OF MEDICAL SCIENCES

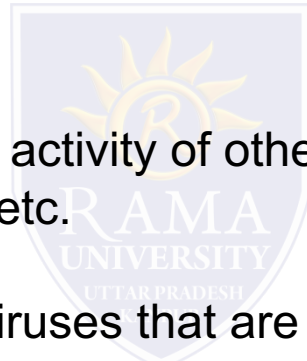
# UNIT-I

## Topic:- Cell-mediated immunity.



# Cell Mediated Immunity

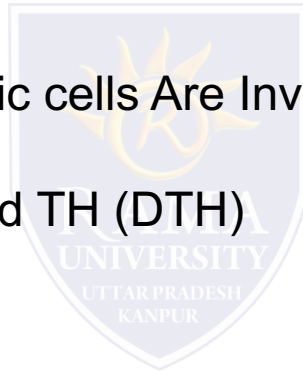
- Involves specialized set of lymphocytes called T cells that recognize foreign antigens on the surface of cells, organisms, or tissues:
  - Two types of T cells are present:
    - Helper T cells
    - Cytotoxic T cells
  - T cells regulate proliferation and activity of other cells of the immune system: B cells, macrophages, neutrophils, etc.
  - Defense against: Bacteria and viruses that are inside host cells and are inaccessible to antibodies and also to Fungi, protozoa, and helminthes also to Cancer cells and Transplanted tissues.



# CELL MEDIATED IMMUNE RESPONSES

Primary Function Of Cell Mediated Response:-

- Eliminate Intracellular Pathogens
- Eliminate Tumor Cells
- Both Ag Specific And Non-specific cells Are Involved
- Ag Specific: CD8+ Cells (TC) And TH (DTH)
- Non-specific: Neutrophils, NK
- Both Specific And Non-specific Require Cytokines
- Humoral And Cell Mediated Do Collaborate



## CMI may play a role in some harmful conditions:

- Hypersensitivity reactions type IV (contact dermatitis)
- Graft rejection
- Autoimmune diseases

➤ Cell mediated cytotoxicity mediated by:

- T-Cytotoxic cells.
- Natural killer cells.
- Activated macrophages.



## CMI HELPS IN

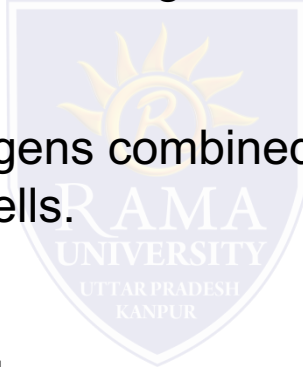
- Delayed hypersensitivity
- Immunity in infections caused by Obligate and facultative intracellular parasites
- E.g. – Tuberculosis, Leprosy , Listeriosis, Brucellosis,
- Fungi – Histoplasmosis, Coccidiomycosis, Blastomycosis,
- Parasites – Trypanosomiasis
- In transplantation immunity,
- Immunology in Transplantation, malignancy,
- Pathogenesis of Autoimmune diseases
- Cell Mediated Immunity Can Be Divided Into 2 Major Categories
- Effectors lyse target
- 2 groups of cells: CTLs (specific) and NK.
- Effectors which are CD4+ and mediate DTH



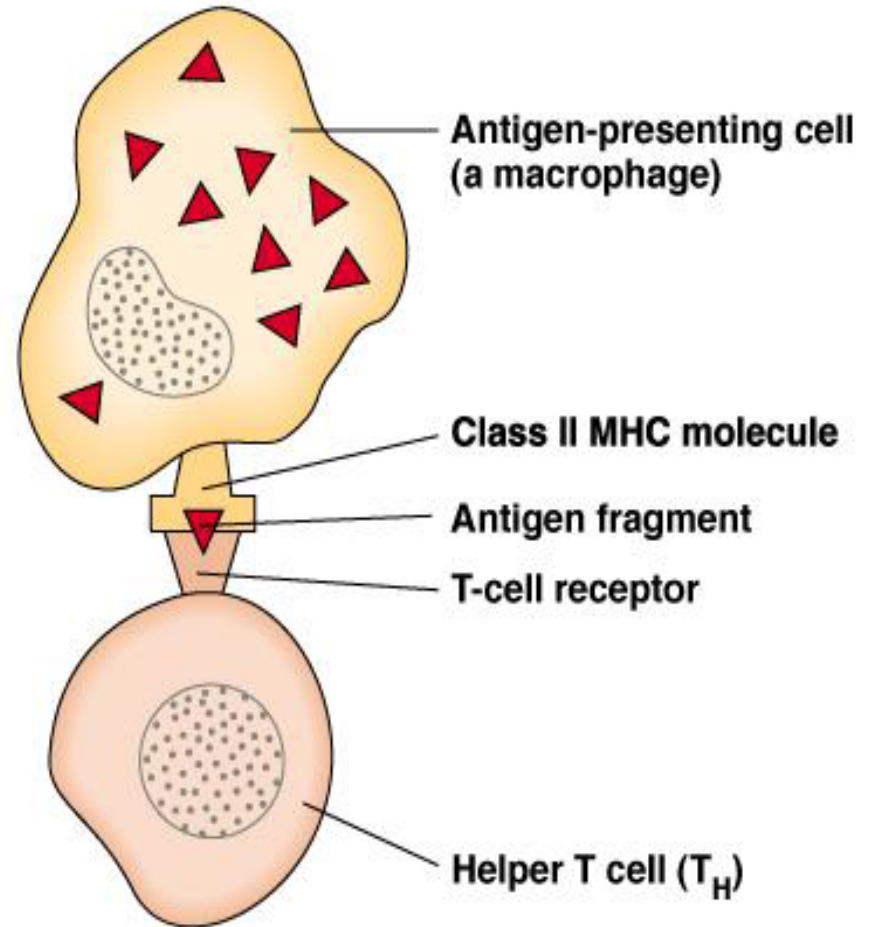
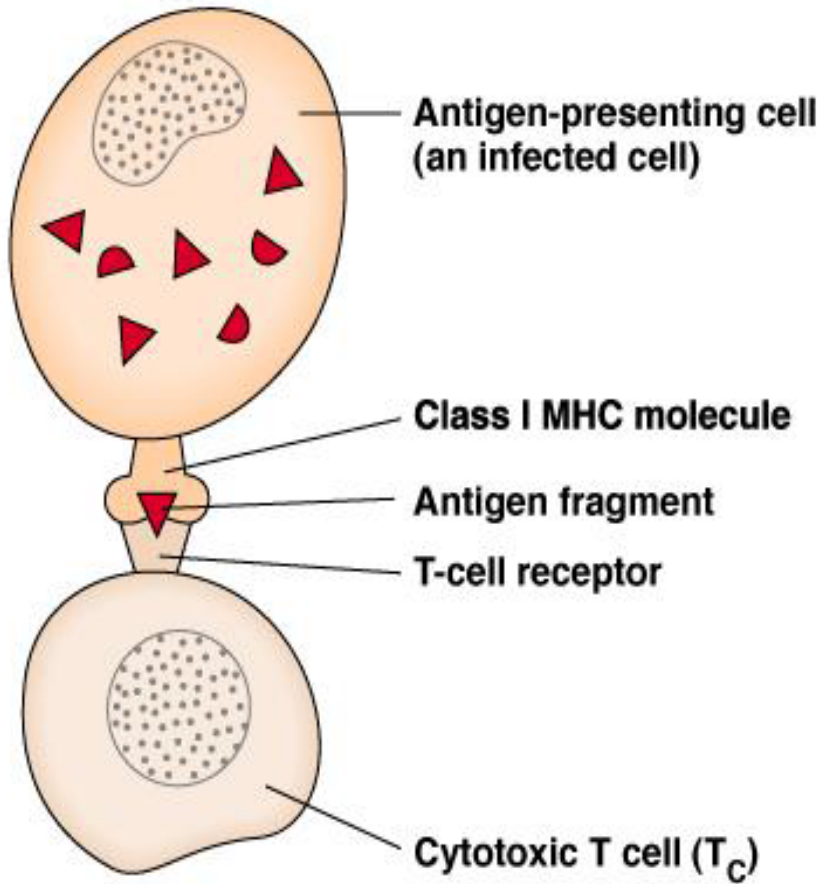
# T Cells and Cell Mediated Immunity

## Cellular Components of Immunity:

- T cells are key cellular component of immunity.
- T cells have an antigen receptor that recognizes and reacts to a specific antigen (T cell receptor).
- T cell receptor only recognize antigens combined with major histocompatibility (MHC) proteins on the surface of cells.
  - MHC Class I: Found on all cells.
  - MHC Class II: Found on phagocytes.
- Clonal selection increases number of T cells.



# T CELLS ONLY RECOGNIZE ANTIGEN ASSOCIATED WITH MHC MOLECULES ON CELL SURFACES



(a)

(b)



# HOW CTLs KILL

## • Phases In CTL Killing

- Conjugate formation.
- LFA-1 (CTL) binds ICAMs (Target).
- LFA-1 changes to high avidity if Ag Is Recognized.
- Activated LFA-1 persists for 5-10 mins.
- Membrane attack.
- Requires  $Ca^{2+}$  and energy
- Granules release Perforins (65 kDa) and Granzymes (serine proteases) at the junctional space.
- Perforins polymerize forming cylindrical pores (5-20 nm),  $Ca^{2+}$  is needed.
- Granzymes enter target cell.
- Granzyme B can enter thru mannose-6-phosphate receptor in a vesicle.
- DNA fragmentation.
- CTL dissociation.
- Target cell destruction.
- Apoptotic death within a few hours.

